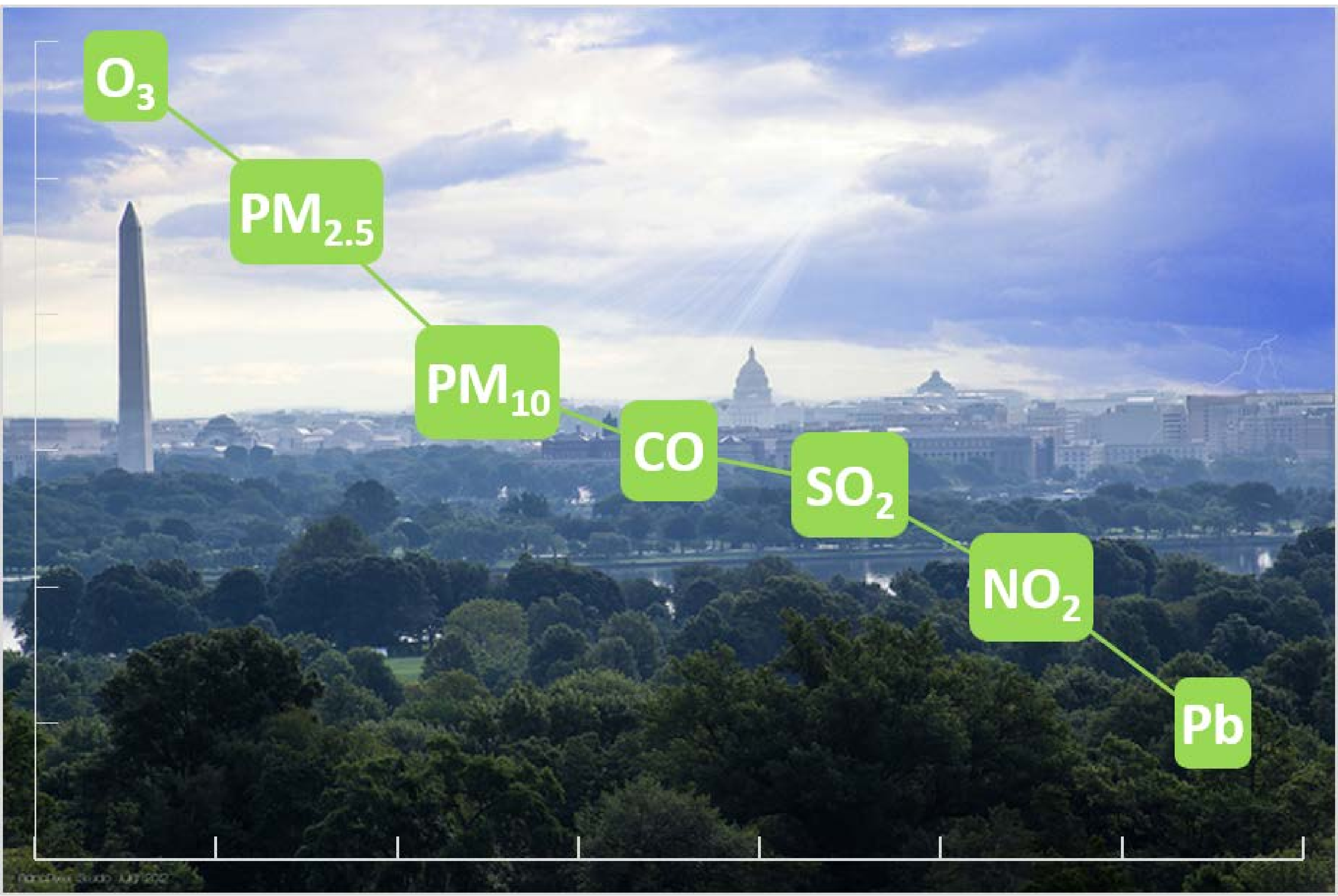
AIR QUALITY TRENDS REPORT - DRAFT

Metropolitan Washington D.C. Region (1993-2016)

September 2017



AIR QUALITY TRENDS REPORT
Prepared by the Metropolitan Washington Council of Governments on behalf of the Metropolitan Washington Air Quality Committee

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TABLE OF CONTENTS

FIGURES AND TABLES

EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA) has established health standards (National Ambient Air Quality Standards, NAAQS) for six air pollutants. These six pollutants, which are also called the criteria air pollutants, are regulated under the federal Clean Air Act (CAA). Table 1 lists the criteria pollutants and their possible precursors.

Table 1: Criteria Pollutants and Precursors [a]

Carbon Monoxide (CO)
Sulfur Dioxide (SO_2)
Nitrogen Dioxide (NO_2)
Particulate Matter (PM)
Lead (Pb)
Ground-Level Ozone (O_3) *Precursors*: Volatile Organic Compounds (VOCs) Nitrogen Oxides (NO_x)

[a] Precursors of a criteria pollutant are chemical compounds that react in the air with other chemical compound(s) to form that criteria pollutant.

In general, there are two types of ambient air quality standards - primary and secondary. The primary NAAQS are designed to protect human health and, by law, are established with an adequate margin of safety to protect all individuals. The secondary NAAQS are established to protect welfare-related values such as agricultural production, forests, building materials, and ecosystems. Sometimes the primary and secondary NAAQS have the same numerical value. For certain pollutants, no secondary standard has been established. Table 2 summarizes the NAAQS for all six criteria pollutants.

The Metropolitan Washington Council of Governments (MWCOG) analyzes monitored air quality data in the Metropolitan Washington, D.C. region and prepares a synthesis report on the status of the air quality in the region. This information is useful for policy makers, local and state governmental planning agencies, the media, and the public with an interest in air quality trends in the national capital region. Figure 1 shows a map of the air quality monitors in the Metropolitan Washington, D.C. region. Table 3 contains the location names and air pollutants that are currently monitored at each location.

This report presents an air quality data analysis for all criteria pollutants during a sixteen-year period, 1999-2015. During this period, only monitors located within the Metropolitan Washington, D.C. region were used in preparing the data summaries. The measured concentrations for the period 1999-2015 are presented in tables complimented by graphs in a manner that permits direct comparison to the NAAQS.

In general, pollution levels have decreased over the past decade. Most pollutants have never exceeded their standards during this eleven-year period and one, lead is not currently monitored.

Table 2: National Ambient Air Quality Standards for Criteria Pollutants

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead		primary and secondary	Rolling 3-month average	0.15 μg/m³	Not to be exceeded
Nitrogen Dioxide		primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	Annual	53 ppb	Annual Mean
Ozone		primary and secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution	$PM_{2.5}$	primary	Annual	12 μg/m³	Annual mean, averaged over 3 years
		secondary	Annual	15 μg/m³	Annual mean, averaged over 3 years
		primary and secondary	24-hour	35 μg/m³	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 μg/m³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

* Table comes from the National Ambient Air Quality Standards Page on the U.S EPA website (http://www.epa.gov/air/criteria.html)

Figure 1: Metropolitan Washington, D.C. Region's Current Air Quality Monitors

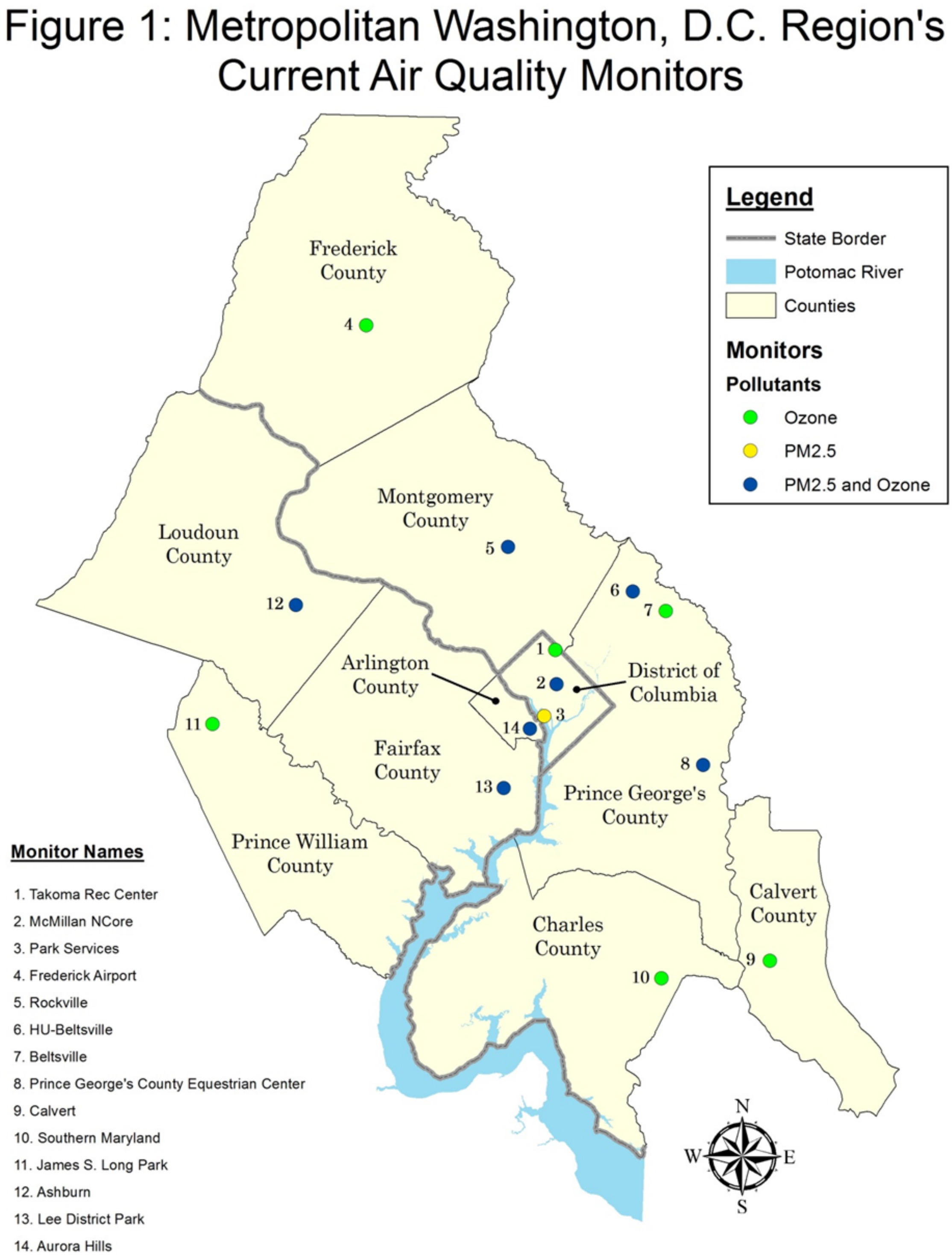


Table 3: Metropolitan Washington, D.C. Region's Current Air Quality Monitors (Key to Figure 1)

Monitor Number	Monitor Name	Years in Operation	Jurisdiction	Pollutants Currently Monitored						
				O3	$PM_{2.5}$	PM_{10}	CO	NO_2	SO_2	Pb
1	Takoma Rec Center*	1985-2016	Washington, D.C.	●				●		
2	McMillan NCore	1994-2016	Washington, D.C.	●	●	●	●	●	●	
3	Park Services	1999-2016	Washington, D.C.		●					
4	Frederick Airport	1999-2016	Frederick Co, MD	●						
5	Rockville	1985-2016	Montgomery Co, MD	●	●					
6	Beltsville (Howard University site)	2005-2016	Prince George's Co, MD	●	●	●	●	●	●	
7	Beltsville	2011-2016	Prince George's Co, MD	●					●	
8	PG Equestrian Center	2002-2016	Prince George's Co, MD	●	●					
9	Calvert	2005-2016	Calvert Co, MD	●						
10	Southern Maryland	1985-2016	Charles Co, MD	●						
11	James S. Long Park	1991-2016	Prince William Co, VA	●				●		
12	Ashburn	1998-2016	Loudoun Co, VA	●	●			●		
13	Lee District Park	1998-2016	Fairfax Co. VA	●	●	●			●	●
14	Aurora Hills	1985-2016	Arlington Co, VA	●	●		●	●		

O_3: Ozone $PM_{2.5}$: Particulate Matter 2.5 µm in diameter or less CO: Carbon Monoxide Pb: Lead
NO_2: Nitrogen Dioxide PM_{10}: Particulate Matter 10 µm in diameter or less SO_2: Sulfur Dioxide
*Note: This monitor was temporarily out of service from July 2, 2013 to November 7, 2013

1. GROUND-LEVEL OZONE (O_3)

Health Effects and Sources

Ozone is a colorless odorless gas that is found in the atmosphere. Each molecule of ozone has three atoms of oxygen. The additional oxygen atom makes ozone extremely reactive and irritating to tissues in the respiratory system.

Ozone exists naturally in the stratosphere, the Earth's upper atmosphere, where it shields the Earth from the sun's ultraviolet rays. However, ozone is also found close to the Earth's surface, where we live and breathe. There, ground-level ozone is an air pollutant.

High concentrations of ground-level ozone may cause inflammation and irritation of the respiratory tract, even during short exposures and particularly during heavy physical exercise. The resulting symptoms may include coughing, throat irritation, and difficulty breathing. Inhaling moderate amounts of ozone, for seven or eight hours, can reduce the ability of our lungs to function properly even in healthy individuals and may worsen asthma attacks in vulnerable people. Ozone may increase the susceptibility of the lungs to infections, allergens, and other air pollutants.

Ground-level ozone is not emitted directly into the air by specific sources. It is created by the chemical reaction between volatile organic compounds (VOCs) and oxides of nitrogen (NOx), in the presence of sunlight and elevated temperatures. For this reason, ground-level ozone concentrations only become elevated during the warmer months of the year. In the Metropolitan Washington, D.C. region, almost all elevated ground-level ozone concentrations are recorded between May through September, during afternoon or early evening hours. Man-made sources of VOCs and NOx are industrial and automobile emissions; commercial products such as paints, insecticides, and cleaners; and the evaporation of gasoline from large and small gasoline and diesel-powered engines. Plants and trees also emit VOCs, which combine especially quickly with NOx to create ozone.

Nitrogen oxides and VOCs are also released from sources hundreds of miles away. Such transported emissions contribute to ground-level ozone in this region and elsewhere in the Eastern United States. Further progress in the control of transported ozone, as well as the implementation of our regional plan, will be needed to meet the ground-level ozone health standard.

National Ambient Air Quality Standards for Ground-Level Ozone

In 1997, the EPA revised the air quality standards for ozone to better reflect new scientific health studies that demonstrated cumulative effects from exposure over an entire day. This new standard is based on an 8-hour averaging period. In June 2004, the EPA officially designated the Metropolitan Washington, D.C. region as moderate nonattainment for the 8-hour ozone standard. On June 15, 2005, the EPA revoked the 1-hour ozone standard. In 2008 the standard was strengthened further from 84 ppb to 75 ppb and again to 70 ppb in 2015.

Table 4: National Ambient Air Quality Standards for Ground-Level Ozone

Averaging Period	Primary Standard	Secondary Standard
8-hour	0.070 ppm	0.070 ppm

Transport of Ground-Level Ozone

The Metropolitan Washington, D.C. region's air quality is significantly affected by ozone and its precursors from other regions outside the Metropolitan Washington, D.C. area. Regional transport occurs when ozone is trapped within the lower layer of the atmosphere over a wide area (e.g., several hundred square miles). These regional-scale ozone plumes become embedded within the large-scale atmospheric flows, affecting areas well away from their source regions. These regional plumes are often observed at ozone monitors located in elevated terrain and can drift across regions and then mix down to the surface affecting monitors over a large area.

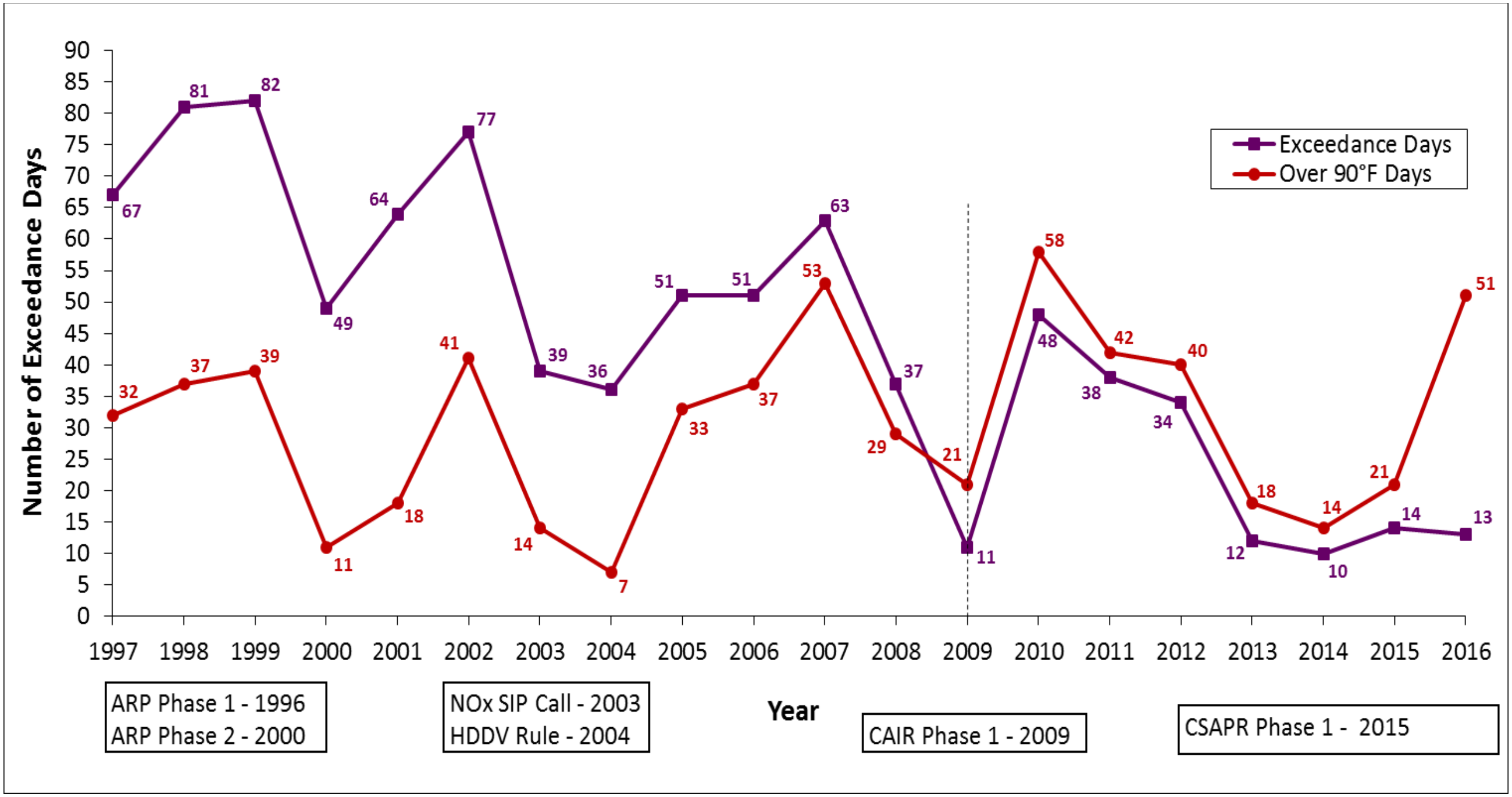
A recent study by Marufu *et al*. provides further evidence of regional ozone transport into the Metropolitan Washington, D.C. region.[1] This paper discusses the August 2003 North American electrical blackout, which provided a unique opportunity to quantify the contribution of emissions from power plants in Northeastern US and Southeastern Canada to ozone levels in the Pennsylvania and Metropolitan Washington, D.C. regions. Regional ozone levels during that period decreased by approximately 38 ppb in response to a 34 percent emission reduction in SO_2, and a 20 percent emission reduction in NO_x. The improvement in air quality provides evidence that transported pollutant emissions from power plants hundreds of kilometers upwind play an important role in ozone production in the Metropolitan Washington, D.C. region.

Ground-Level Ozone Trends

Trends analysis of ground-level ozone is complicated by the influence of weather systems on the formation of ozone. Ozone concentrations are quite dependent on meteorological conditions. In particular, temperatures above 90 degrees Fahrenheit (ºF), light winds, and stationary high pressure systems contribute to the formation of unhealthy ozone levels. Some years may have warmer and sunnier summers than other years and in those years, ozone levels can reach high values more often despite very little change in the emission rates of ozone-forming precursors. Correlations can be made between ozone concentrations and meteorological variables such as the number of 90ºF days, average temperature, and average winds during the peak hours of ozone formation. Hot, dry summers can produce long periods of elevated ozone concentrations, while cool and wet summers can limit ozone production. For this report, the influence of weather is partially removed by averaging the highest levels of ozone concentrations over a three-year period. This method is consistent with EPA's method of using three consecutive year periods as a basis for determining compliance. Figure 2 shows that in the past there were more exceedances than 90°F days. In recent years, new measures have improved ozone levels in the region to the point where there are now more 90°F days than ozone exceedance days.

[1] The 2003 North American electrical blackout: An accidental experiment in atmospheric chemistry, Marufu, et al.; Geophysical Research Letters, Vol. 31, 2004.

Figure 2: Over 90°F Days (Dulles) and 8-hour Ozone Exceedance Days (2015 std)



8-Hour Average Ozone Levels

The maximum 8-hour ozone concentrations at each monitor in the region are given in Table A-1. Figure 3 shows the number of days from 1997-2016 that the 2015 8-hour ozone standard was exceeded. Data shows that there is a gradual improvement in the number of exceedances of the 8-hour standard from year to year. Figure 4 shows the 3-year average of the fourth highest ozone value recorded in the region, which is also called the design value.

Figure 3: Number of Exceedance Days from 1997-2016 Under the 2015 Ozone Standard (70 ppb)

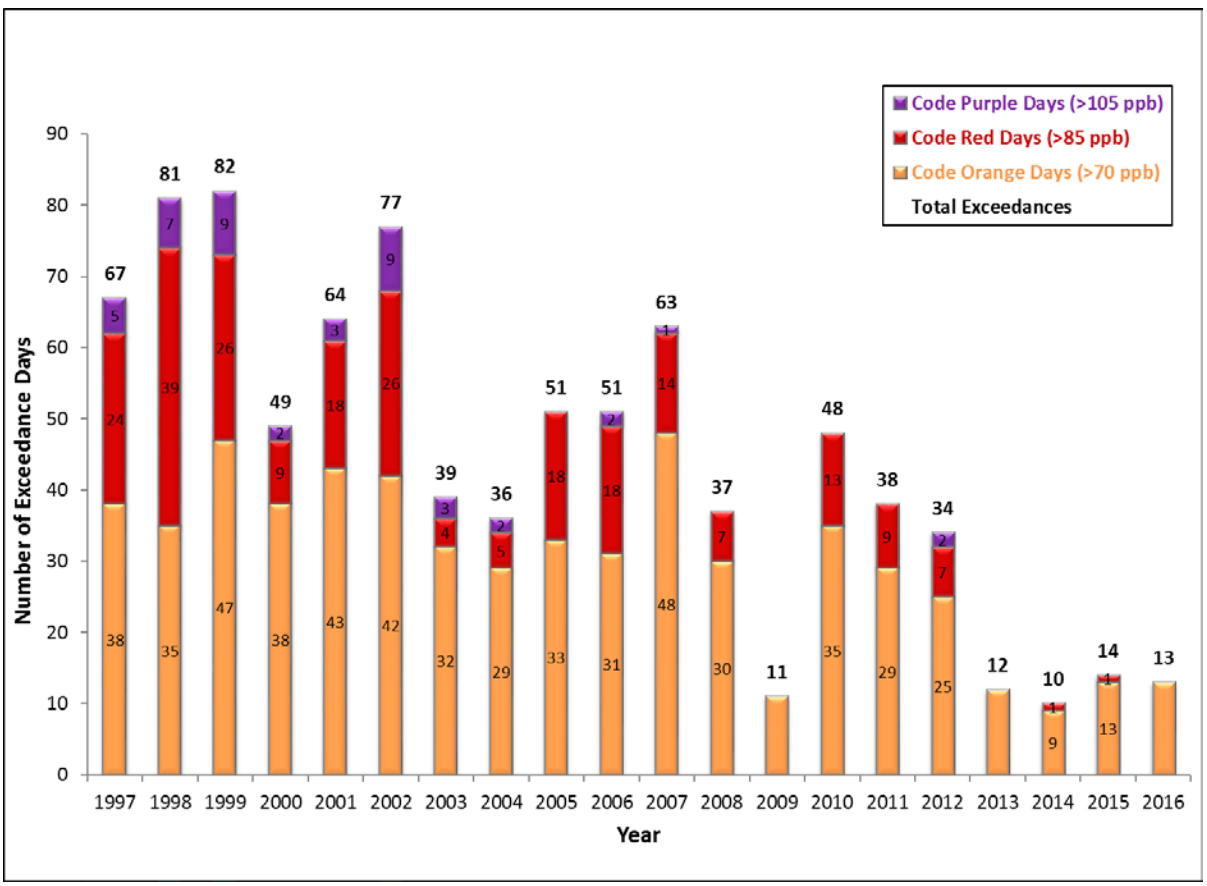
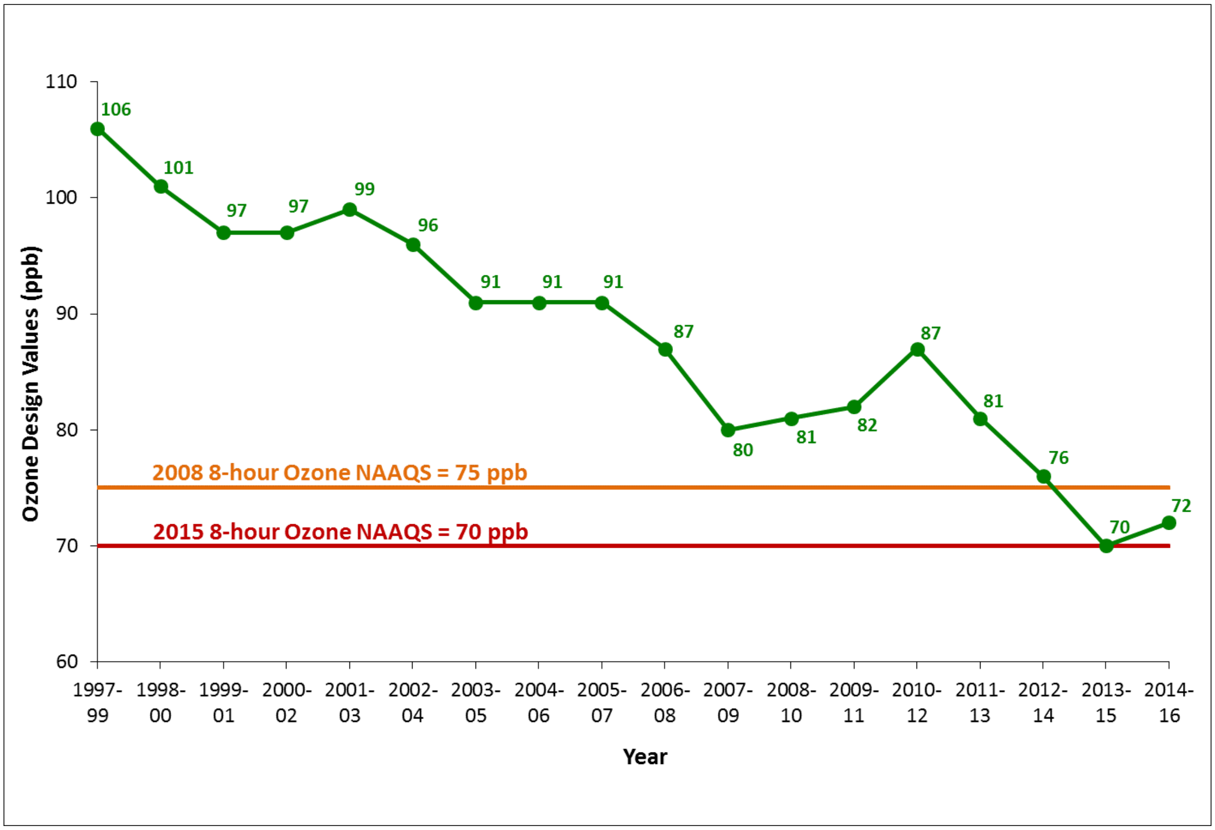


Figure 4: 8-hour Ozone Design Values in the DC-MD-VA Nonattainment Area from 1999-2016



* Design value = 3-year average of 4th highest daily maximum 8-hour average ozone concentrations.

Summary of Ozone Trends

The data show that while the Metropolitan Washington, D.C. region has remained above the 8-hour ozone standard until the most recent years, trends in the 8-hour exceedance days and the design values have been downwards since the 1997 8-hour ozone standard was in place.

2. PARTICULATE MATTER (PM)

Particulate Matter is a mixture of microscopic solid particles and liquid droplets suspended in air. This pollution is comprised of a number of components including acids (nitrates and sulfates), organic chemicals, metals, soil or dust particles, and allergens (such as pollen or mold spores).

The two classes of particles the region is required to monitor are PM_{10} and $PM_{2.5}$. PM_{10} refers to those particles less than 10 microns in diameter. $PM_{2.5}$ refers to those particles less than 2.5 microns in diameter. Figure 5 graphically depicts the relative size of both PM_{10} and $PM_{2.5}$.

Figure 5: The Size of Particulate Matter

Particulate matter in the region is measured using two different methods; the federal reference method and the continuous monitor method. Federal reference method instruments acquire deposits over 24-hour periods on filters from ambient air drawn into the monitor through an inlet. This method requires the samples to be sent to a laboratory for analysis.

To make particulate matter data available to the public in a timely manner, continuous monitors are also used in the Metropolitan Washington, D.C. region. These monitors collect particle data on an hourly basis. Since these monitors collect particle samples more frequently, this data is used to calculate the Air Quality Index posted on the Metropolitan Washington Council of Governments (MWCOG) website.

Health Effects and Sources

Particulate matter comprises a broad class of aerosol particles from fine smoke and soot (products of incomplete combustion) to larger sized dusts and industrially generated particles. Particulate matter also includes particles formed by reactions in the atmosphere from gaseous pollutants. The largest components of particulates in urban areas along the east coast are sulfates formed from SO_2 emissions.

The size of the particles directly relates to their potential for causing health problems. Small particles less than 10 micrometers (microns) in diameter pose the greatest problems, because they can travel deep into the lungs. Some of these particles may even move into the bloodstream. Exposure to such particles can affect both the respiratory and cardiovascular systems. Larger particles are of less concern, although they can irritate the eyes, nose, and throat.

Concerns about the health effects of breathing particles include potential damage to the respiratory and cardiovascular systems, lung tissue damage, cancer, and premature death. Particulate matter is a major cause of reduced visibility in many regions and national parks, and it can also cause damage to building materials.

National Ambient Air Quality Standards for Particulate Matter

The national ambient air quality standards for PM_{10} were established in 1987. These initial standards should not be confused with the newer standards for very fine particles, known as $PM_{2.5}$. In 1997, the EPA established a new health standard for fine particulate (particles with aerodynamic diameters of less than 2.5 microns, $PM_{2.5}$). In November 2004, the EPA designated the following jurisdictions in the Metropolitan Washington, D.C. region as nonattainment for the annual $PM_{2.5}$ standard: Charles County, MD, Frederick County, MD, Montgomery County, MD, Prince George's County, MD, the District of Columbia, the City of Alexandria, VA, Arlington County, VA, Fairfax County, VA, Loudoun County, VA, and Prince William County, VA. Table 5 provides the NAAQS for PM_{10} and $PM_{2.5}$.

Table 5: National Ambient Air Quality Standard for Particulate Matter

Pollutant	Averaging Time	Primary Standard	Secondary Standard
PM_{10}	24-hour [a]	150 µg/m³	150 µg/m³
$PM_{2.5}$	24-hour [b]	35 µg/m³	35 µg/m³
	Annual [c]	12 µg/m³	15 µg/m³

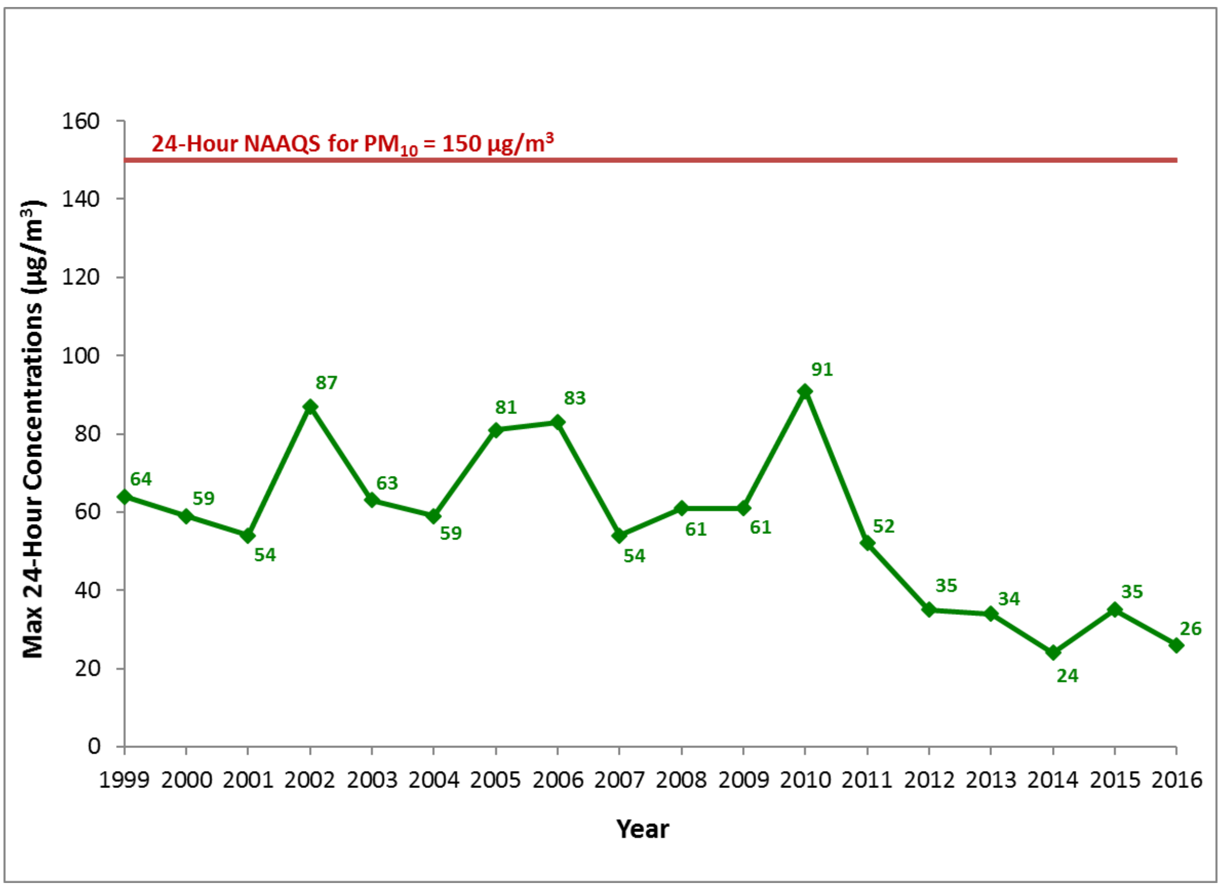
[a] Not to be exceeded more than once a year averaged over 3 years
[b] The 3-year average of the 98th percentile at each monitor must not exceed the standard.
[c] The 3-year average of the weighted annual mean concentration at each monitor must not exceed the standard.

PM_{10} Trends

The federal health standard for particulate matter was changed in 1987 from Total Suspended Particulate (TSP) to PM_{10} in order to reflect the fact that non-respirable particles greater than 10 microns in diameter were being measured by the TSP samplers then in place. Therefore, the trend data for PM_{10} begin with the 1989 data when broad scale PM_{10} sampling began in this area.

Particulate matter data measured as PM_{10} are presented in Table A-6. Figure 6 shows the annual maximum 24-hour average concentrations for PM_{10}. The 24-hour NAAQS is determined by averaging the number of exceedances over a three-year period. If the average number of exceedances is over 1 per each three-year period, the area is considered to be in exceedance of the standard.

Figure 6: Maximum 24-Hour Average Concentrations for PM10 in the Washington, D.C. Region from 1999-2016



$PM_{2.5}$ Trends

A new federal health standard for particulate matter was created in 1997 for $PM_{2.5}$. The standard was updated again in 2006 and 2012, lowering the 24-hour standard from 65 µg/m^3 to 35 µg/m^3 and the primary annual standard from 15 µg/m^3 to 12 µg/m^3. A secondary 24-hour standard of 15 µg/m^3 was also adapted in 2012. The Metropolitan Washington, D.C. region began monitoring for $PM_{2.5}$ in 1999. Particulate matter data measured as $PM_{2.5}$ are presented in Table A-7 and A-8.

Figure 7 shows that the number of daily exceedances of the 2006 NAAQS has been steadily decreasing since 2001, which reflects the progress shown in Figures 8 and 9. Figure 8 shows the annual average $PM_{2.5}$ design values for the Metropolitan Washington, D.C. region. The data shows a general downward trend. Figure 9 shows the 24-hour average $PM_{2.5}$ design values for the Metropolitan Washington, D.C. region for the same period. The data shows that the Metropolitan Washington, D.C. region is below the 24-hour and annual $PM_{2.5}$ NAAQS.

Summary

All monitors in the Metropolitan Washington, D.C. region are well within the PM_{10} NAAQS.
Since 2005 the Metropolitan Washington, D.C. region has been within both of the $PM_{2.5}$ standards as PM concentrations have been trending downward over the last decade.

Figure 7: Number of Exceedance Days from 1999 - 2016 Under the 2006 24-Hour PM2.5 Standard (35 µg/m3)

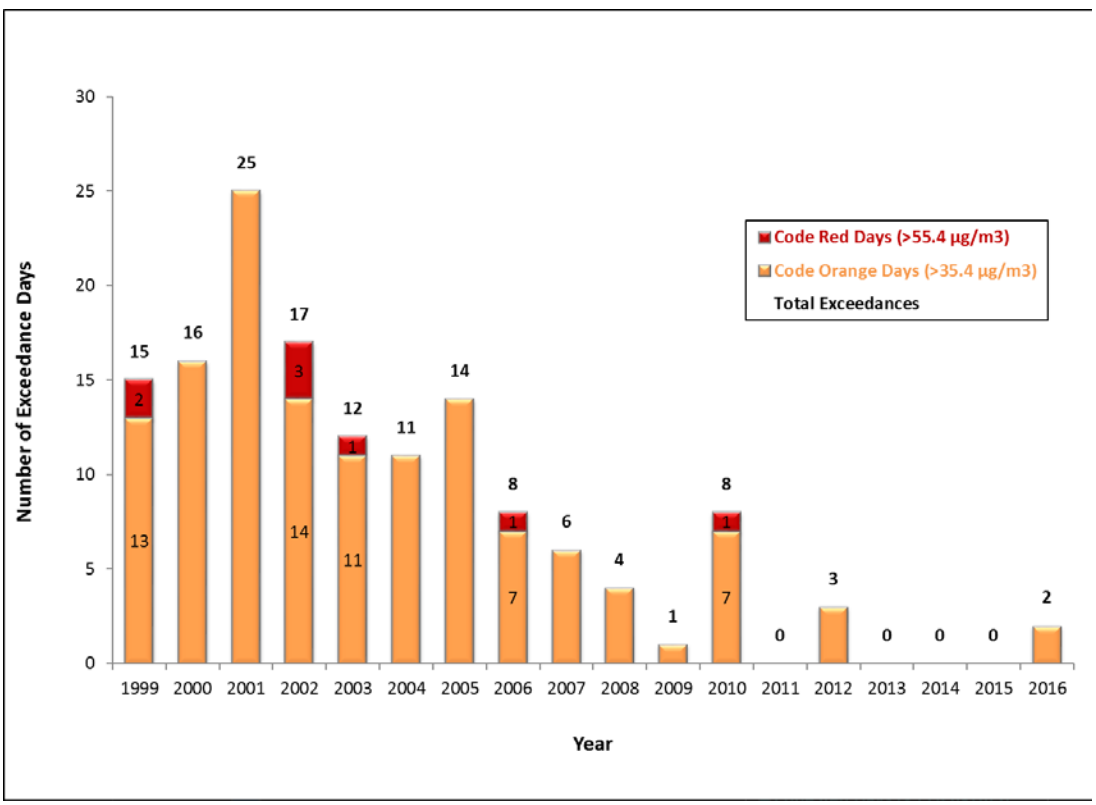
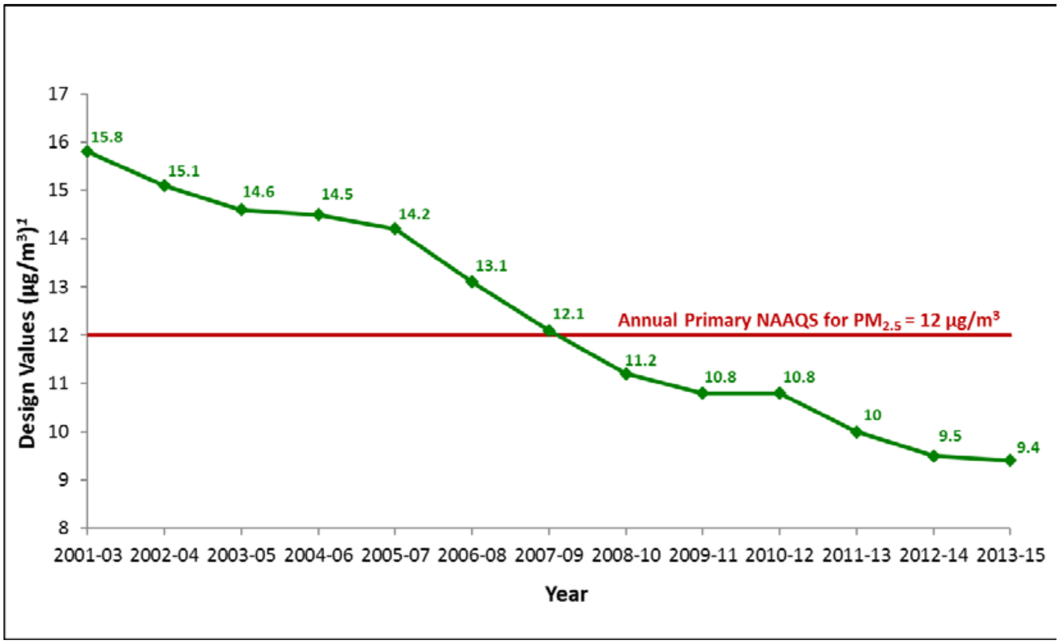
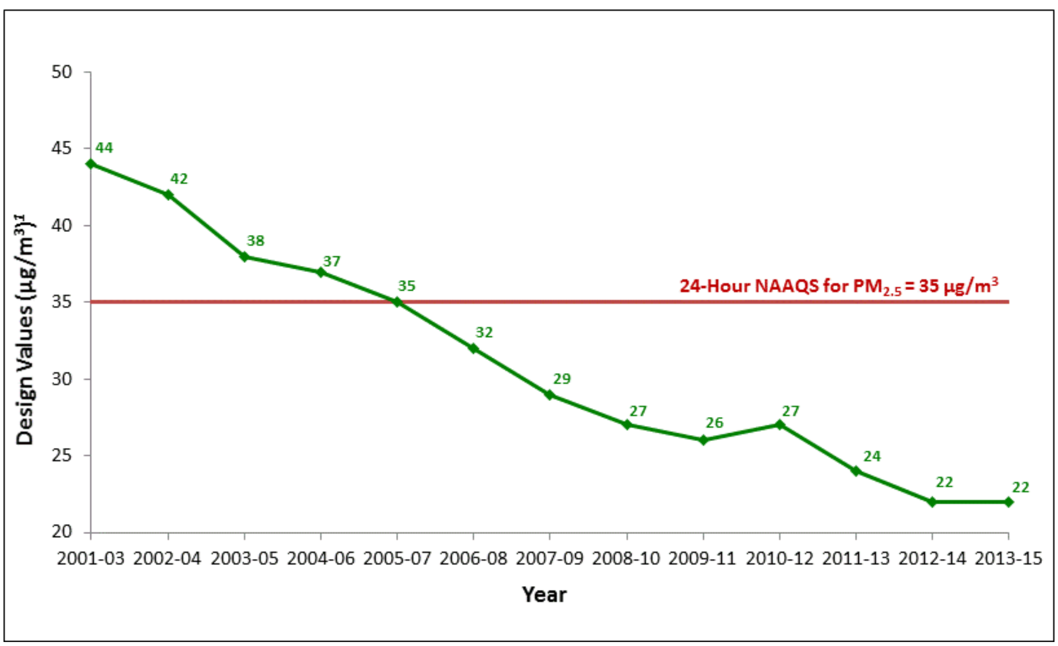


Figure 8: Annual Design Values for $PM_{2.5}$ in the Washington, D.C. Region from 2003-2015



[1] The Annual Design Value for PM2.5 is the 3-year average of the annual mean PM2.5 concentration

Figure 9: 24-Hour Design Values for $PM_{2.5}$ in the Washington, D.C. Region from 2003-2015



[1] The 24-hr Design Value for PM2.5 is the 3-year average of the 98th percentile

3. CARBON MONOXIDE (CO)

Health Effects and Sources

Carbon monoxide (CO) is a colorless, odorless, and in high concentrations, poisonous gas that forms when the carbon in fuels is not completely burned. When CO enters the bloodstream, it reduces the capacity of the body to deliver oxygen to its organs and tissues, thus depriving the body of an essential component for life. The health threat from ambient CO is most serious for those who suffer from particular cardiovascular diseases. Elevated CO levels can lead to visual impairment, reduced work capacity, poor learning ability, and difficulty in the performance of complex tasks. At still higher levels, levels that can occur in the indoor environment, CO can lead to headaches and nausea, even in healthy persons. Fortunately, the health threat from current levels of ambient CO in the Metropolitan Washington, D.C. region is minimal for healthy individuals.

Carbon monoxide in ambient air mainly results from the incomplete combustion of fuels in motor vehicles. Concentrations tend to be highest in winter months due to the presence of thermal inversions, “cold starting” of automobile engines, and the use of inefficient or poorly maintained space heating systems in certain local areas.

Other sources of CO emissions include industrial processes (including metals processing and chemical manufacturing), residential wood burning, and natural sources such as forest fires. Woodstoves, gas stoves, cigarette smoke, and unvented gas and kerosene space heaters are sources of indoor CO.

National Ambient Air Quality Standards for CO

Table 6: National Ambient Air Quality Standards for CO

Averaging Period*	Primary Standard	Secondary Standard
1-hour	35 ppm	None
8-hour	9 ppm	None

Carbon Monoxide Trends

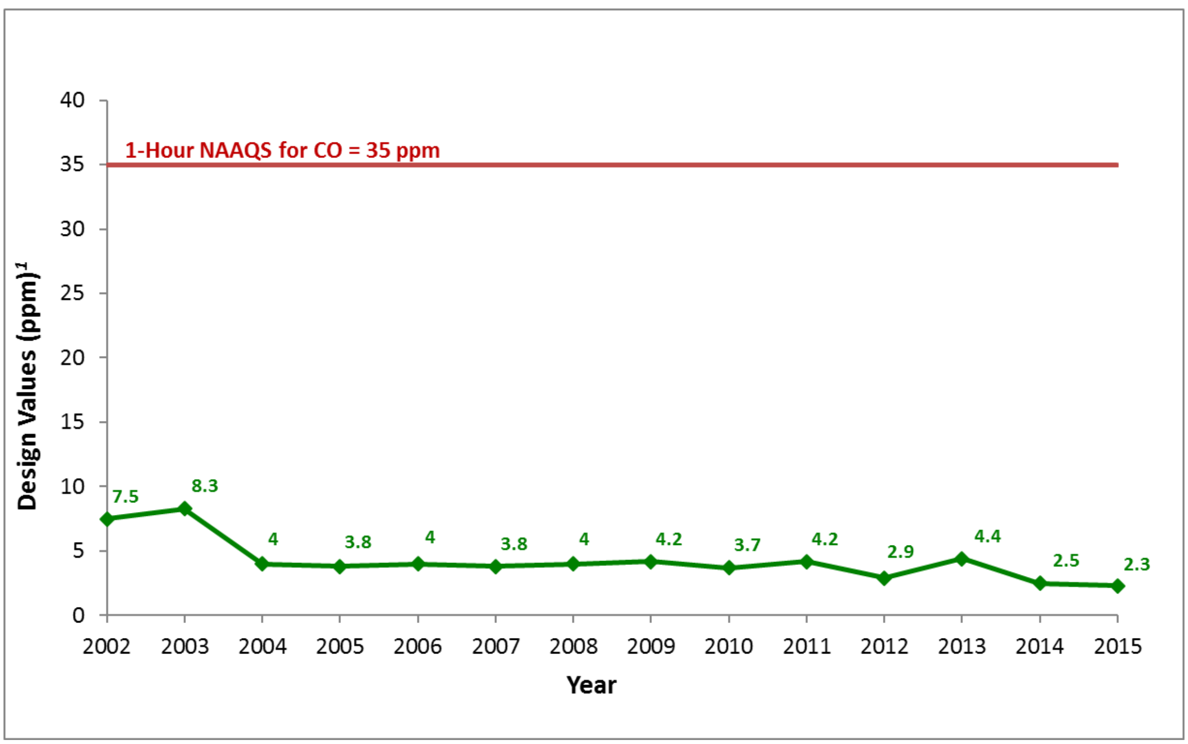
Both the 1-hour and 8-hour NAAQS for carbon monoxide require that the second maximum value in either category does not exceed the standard (one exceedance is allowed each year which is why the second maximum is used). The second maximum for each category is selected on a two year basis, in which the highest second maximum value of the two years is used as the design value for that period.

Table A-2 shows that 8-hour averaged CO levels in the Metropolitan Washington, D.C. Region have been steadily declining and the region is in attainment of the health standards. Presented in Figure 10 and Figure 11 are the highest CO concentrations based on 1-hour averages, and 8-hour averages respectively.

Summary

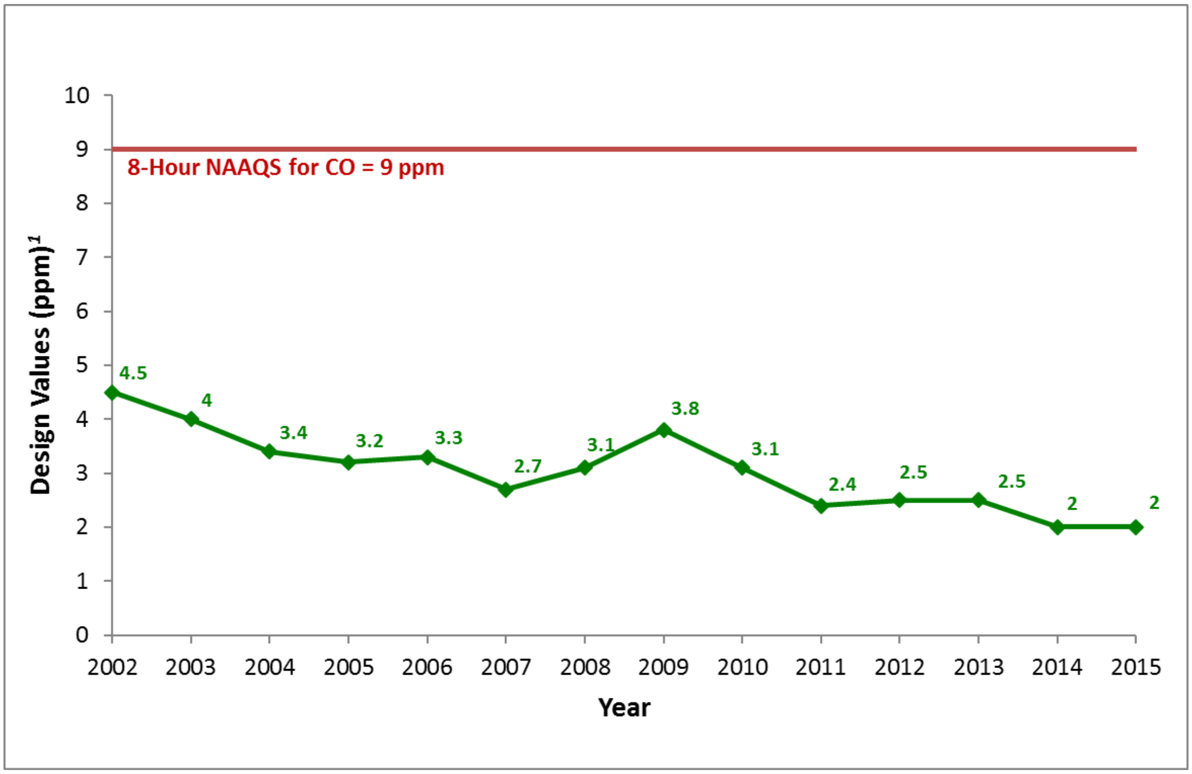
The 8-hour and 1-hour data illustrate that carbon monoxide levels in the Metropolitan Washington, D.C. Region have been steadily improving for the past decade. Since 1990, all monitors in the region have shown both 1-hour and 8-hour averaged CO concentrations to be below the ambient air standards.

Figure 10: 1-Hour Design Values for Carbon Monoxide in the Washington, D.C. Region from 2002-2015



[1] The 1-Hour Design Value for CO is the highest concentration over 1 year

Figure 11: 8-Hour Design Values for Carbon Monoxide (Washington, D.C. Region, 2002-2015)



[1] The 8-Hour Design Value for CO is the highest concentration over 1 year

4. SULFUR DIOXIDE (SO_2)

Health Effects and Sources

Sulfur dioxide is a gas that forms when sulfur-bearing fuels (mainly coal and oil) are burned. SO_2 can also be released into the air during certain industrial processes. High concentrations of SO_2 can result in difficulties in breathing, respiratory illness, the aggravation of existing cardiovascular disease, and can cause alterations in the lungs' defenses. The primary ambient air quality standard is intended to protect against these adverse health effects.

Ambient sulfur dioxide can be detrimental to the environment as well. SO_2 can have damaging effects on the foliage of trees and agricultural crops. The presence of both sulfur dioxide and nitrogen dioxide in the atmosphere can lead to acidic deposition (acid rain). Thus, the EPA has established a secondary ambient air quality standard for SO_2 based on 3-hour averaged concentrations.

National Ambient Air Quality Standards for SO_2

For the region as a whole, all monitors must attain both the primary and secondary standards for the region to be considered in attainment with the NAAQS.

Table 7: National Ambient Air Quality Standards for SO_2

Averaging Period	Primary Standard	Secondary Standard
1-hour	75 ppb (.075 ppm)	None
3-hour	None	500 ppb (0.50 ppm)

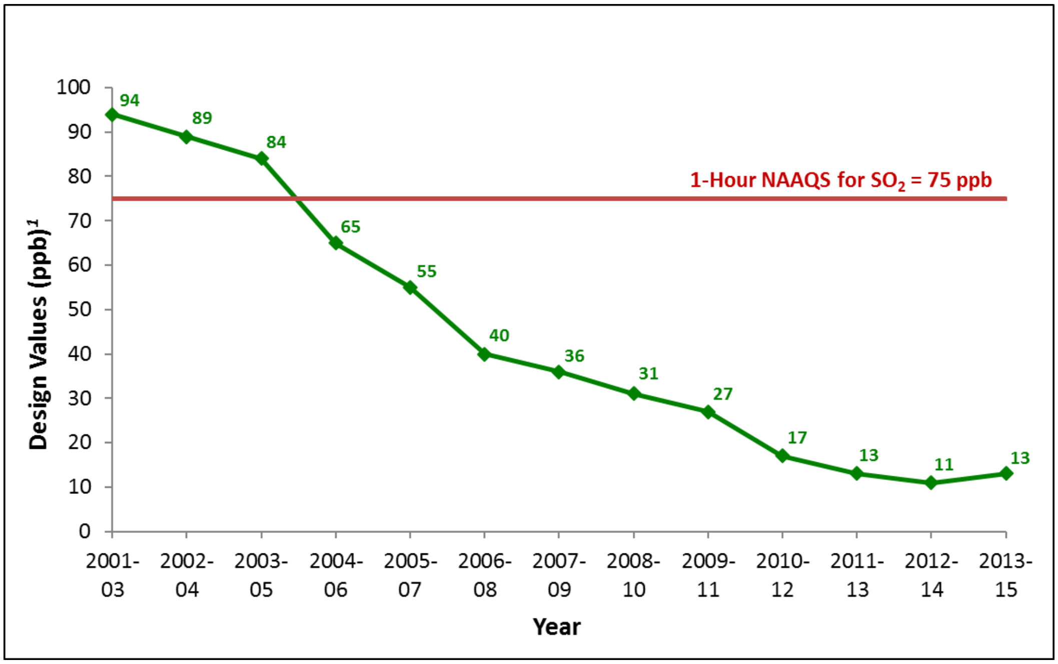
SO_2 Trends

A general characterization of SO_2 concentrations in the Metropolitan Washington, D.C. region is that levels are low and declining. Figure 12 and Table A-4 show the maximum 1-hour SO_2 design values for each year for the analysis period, 2003-2015. The data shows that in recent years the highest SO_2 levels in the region have been less than the 1-hour health standard of .075 ppm (75 ppb). Additionally, Figure 13 shows that observed values have been less than 20% of the 3-hour federal secondary health standard of 0.5 ppm since 1999.

Summary

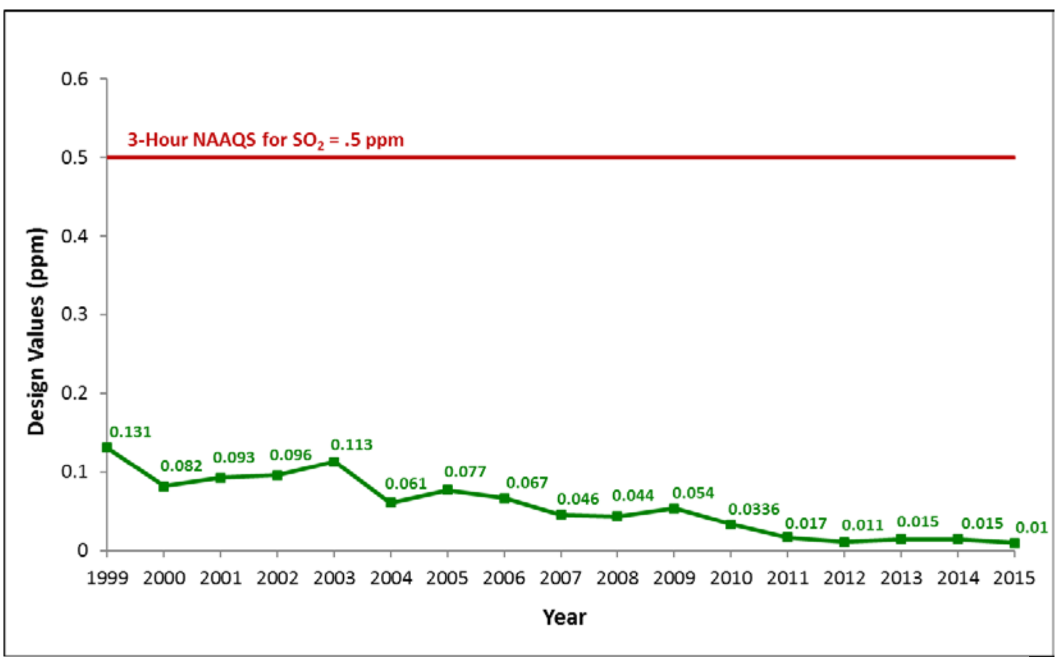
All monitors in the Metropolitan Washington, D.C. Region are well within each of the sulfur dioxide NAAQS.

Figure 12: 1-Hour Design Values for Sulfur Dioxide in the Washington, D.C. Region from 2003 - 2015



[1] The 1-Hour Design Value for SO_2 is the 3-year average of the 99th percentile of 1-hour daily maximum concentrations

Figure 13: 3-Hour Design Values for Sulfur Dioxide in the Washington, D.C. Region from 1999 - 2015



* The 3-Hour Design Value for SO_2 is the highest concentration over 1 year

5. NITROGEN DIOXIDE (NO_2)

Health Effects and Sources

Nitrogen dioxide is a gaseous pollutant that belongs to a class of compounds called nitrogen oxides (NO_x). NO_2 can irritate the lungs and lower resistance to respiratory infections. NO_2 is a brownish and highly reactive gas. It is formed during the high-temperature combustion of fuels in vehicle engines and industrial facilities (primarily electric generating power plants). NO_2 plays a major role in the atmospheric reactions that produce ground-level ozone in the warmer months.

National Ambient Air Quality Standards for NO_2

EPA has established a long-term (annual average) ambient air quality standard and a short term (1-hour) air quality standard for NO_2 as seen in Table 8.

Table 8: National Ambient Air Quality Standards for NO_2

Averaging Period	Primary Standard	Secondary Standard
Annual	53 ppb (0.053 ppm)	53 ppb (0.053 ppm)
1-Hour	100 ppb (0.1 ppm)	None

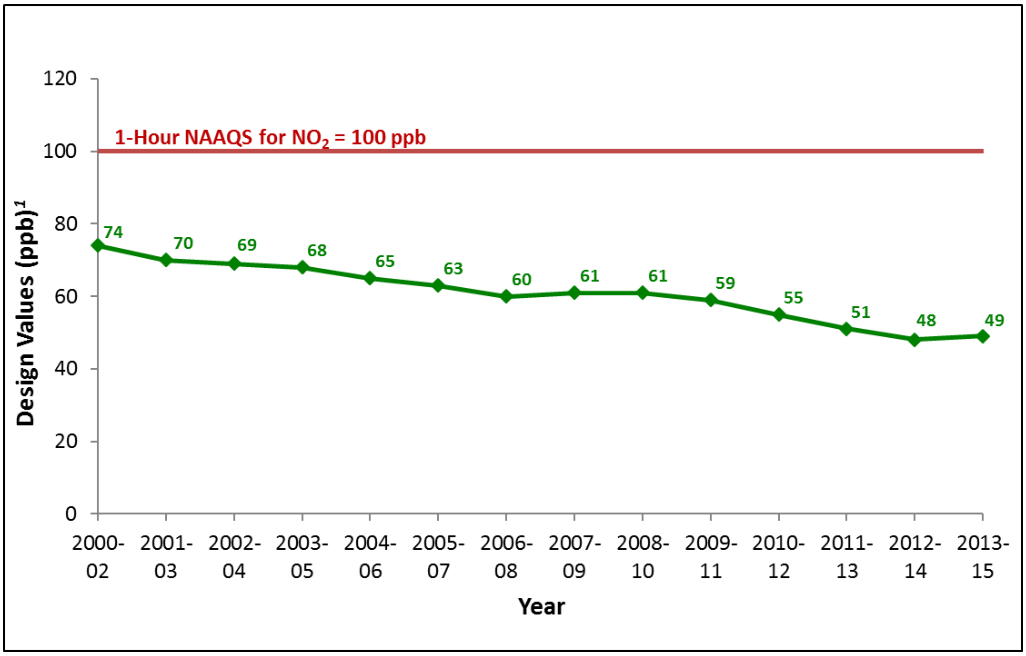
NO_2 Trends

Figure 14 shows the 1-hour NO_2 design value, which is the maximum 3-year average of the 99th percentile of 1-hour NO_2 concentrations from each year. As evidenced by the figure, our current NO_2 concentrations are about half of the NAAQS standard and are in a downward trend. Figure 15 also shows our compliance with the annual NO_2 standard of 0.053 ppm. As of 2013 our annual averages are about a quarter of the standard. Figure 16 shows that the median and lowest maximum 1-hour NO_2 concentrations are generally becoming lower and lower; however, the highest monitor concentrations appear to be more random and focused on extreme events.

Summary

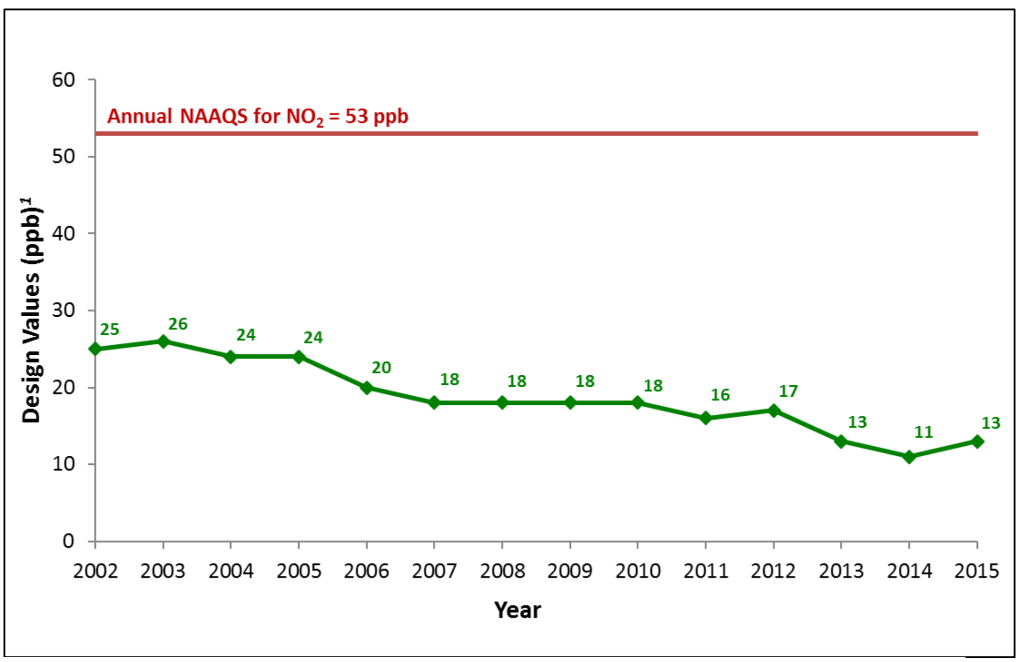
All monitors in the Metropolitan Washington, D.C. Region are well within each of the nitrogen dioxide NAAQS.

Figure 14: 1-Hour Design Values for Nitrogen Dioxide in the Washington, D.C. Region from 2002-2015



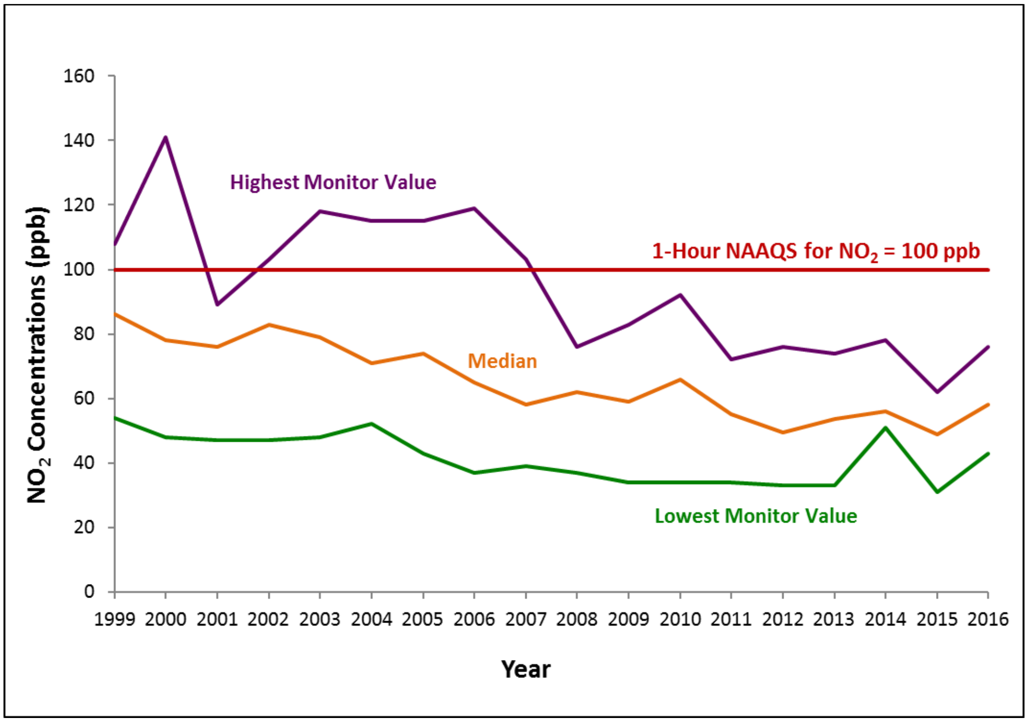
[1] The 1-Hour Design Value for NO_2 is a 3-year average of the 98th percentile of 1-hour daily maximum concentrations

Figure 15: Annual Design Values for Nitrogen Dioxide in the Washington, D.C. Region from 2002-2015



[1] The Annual Design Value for NO_2 is the annual mean of NO_2 concentrations

Figure 16: Maximum 1-Hour Monitor Concentrations for Nitrogen Dioxide in the Washington, D.C. Region from 1999-2016



6. LEAD (PB)

Health Effects and Sources

Lead in ambient air mainly result from soils and dusts that have become contaminated with lead from older paints and other lead-containing construction material. The elimination of lead as an additive to motor fuels two decades ago has substantially reduced lead in ambient atmospheres.

Exposure to lead is a serious health concern because lead can accumulate in the blood, bone, and soft tissue of the body. Excessive exposure may cause anemia, kidney disease, reproductive disorders, and neurological impairments. Even at low doses, lead exposure is associated with the hindrance of fundamental processes in the body. For children, susceptibility to low doses may lead to central nervous system damage or slowed growth.

National Ambient Air Quality Standards for Pb

Table 9: National Ambient Air Quality Standards for Pb

Averaging Period	Primary Standard	Secondary Standard
Rolling 3-Month Average	0.15 μg/m^3	0.15 μg/m^3

Pb Trends

In 2008 the NAAQS for lead was changed from 1.5 μg/m^3 on a quarterly average, to 0.15 μg/m^3 on a rolling three-month average. Lead in the Metropolitan Washington, D.C. region had been far enough under the standard that monitoring ended in Maryland in 1994, Virginia in 1998 and D.C. in 2001 with the EPA's approval; however, the new standards have prompted new monitoring requirements. The new monitors will be placed depending on population and on lead industrial sources, and will employ a method of monitoring different than the method used by monitors before 2001. These new monitors must be in place by January 1, 2011. Figure 18 shows the region's annual average lead concentrations compared to the 1978 standard of 1.5 μg/m^3 and 2008 standard of 0.15 μg/m^3. In order to determine attainment with the new standard, Virginia calculated design values for the new standard for the years 2006-2008 and found that the values are less than 0.05 μg/m^3. These values, however, were calculated from a monitor that is not consistent with the new EPA monitoring method.

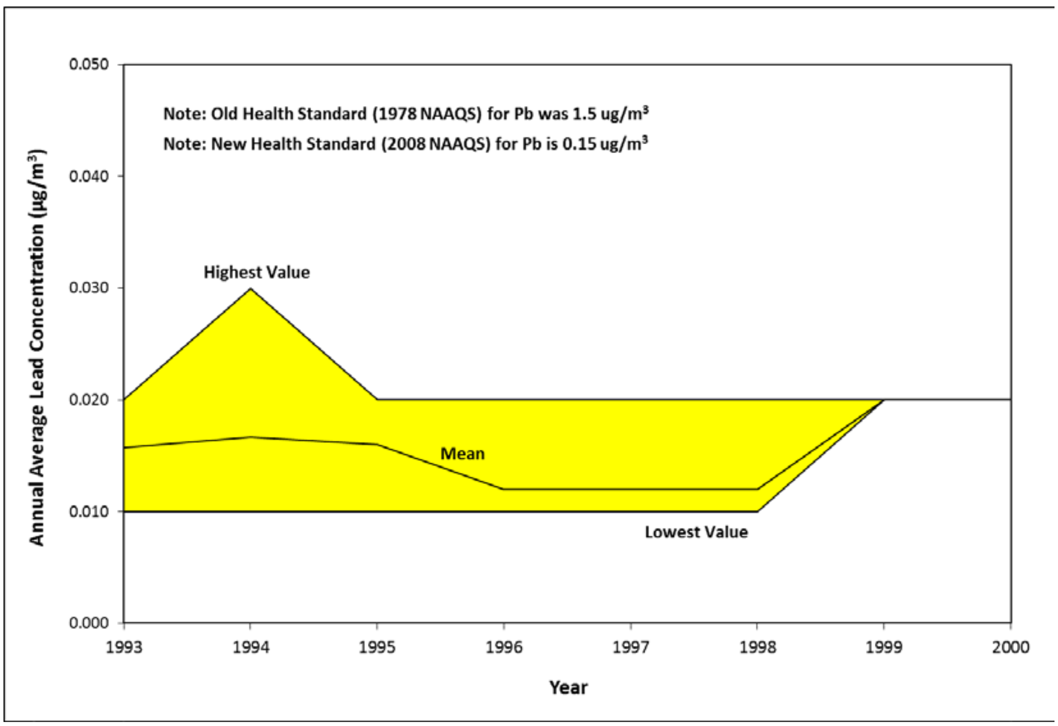
Summary

The monitors showed the Metropolitan Washington, D.C. Region was in compliance with the 1978 NAAQS and it is anticipated that the region will also be in compliance with the new 2008 NAAQS.

NOTE:

Maryland Department of the Environment (MDE) installed a new PM10 based lead monitor at the HU-Beltsville site on January 1, 2012. The District of Columbia Department of Energy & Environment (DOEE) installed a Total Suspended Particle (TSP) based lead monitor at the McMillan Reservoir location on January 1, 2012. Both monitors have an annual average of 0.00 μg/m^3 for both 2012 and 2013.

Figure 17: Annual Average Lead Concentrations in the Washington, D.C. Region from 1993-2000



* This graph represents data collected with a different monitoring technique than the one laid out in the new 2008 NAAQS for lead, lead monitoring was discontinued in the region in 2001.

APPENDIX A

Table A-1: Fourth Highest 8-hour Daily Maximum Ozone Concentrations by Monitor (ppm)

MONITOR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Takoma	0.097	0.094	0.088	0.097	0.079	0.08	0.077	0.083	0.084	0.075	0.068	0.080	-	-	-	0.069	0.072	0.071
River Terrace	0.094	0.080	0.092	0.102	0.082	0.07	0.081	0.087	0.089	0.082	0.064	0.086	0.079	0.076	0.062	-	-	0.065
McMillian	0.103	0.083	0.097	0.106	0.081	0.081	0.086	0.09	0.087	0.084	0.071	0.082	0.085	0.087	0.066			
McMillian NCORE														0.082	0.064	0.068	0.072	0.072
Calvert	0.093	0.089	0.088	-	-	-	0.082	0.083	0.079	0.077	0.068	0.087	0.082	0.082	0.067	0.070	0.067	0.068
S. Maryland	0.106	0.093	0.091	0.098	0.093	0.083	0.089	0.085	0.083	0.078	0.066	0.082	0.085	0.084	0.064	0.067	0.068	0.073
Frederick	0.095	0.086	0.094	0.095	0.077	0.077	0.08	0.085	0.086	0.075	0.069	0.083	0.077	0.078	0.069	0.063	0.070	0.066
Rockville	0.092	0.082	0.095	0.092	0.078	0.08	0.083	0.088	0.088	0.076	0.070	0.077	0.081	0.073	0.069	0.064	0.072	0.065
Greenbelt	0.104	0.090	0.099	0.098	0.083													
Suitland	0.099	0.081	0.101															
PG Equestrian Center				0.101	0.097	0.086	0.092	0.095	0.088	0.079	0.067	0.085	0.086	0.090	0.069	0.069	0.069	0.073
HU-Beltsville							0.085	0.086	0.084	0.081	0.070	0.085	0.083	0.079	0.068	0.065	0.072	0.069
Beltsville													0.084	0.084	0.072	0.069	0.067	0.070
Arlington	0.100	0.080	0.098	0.112	0.087	0.087	0.088	0.085	0.088	0.084	0.067	0.087	0.087	0.084	0.067	0.071	0.073	0.072
Cub Run	0.092	0.079	0.093	0.092	0.083	0.079	0.076	0.081	0.078	0.078	0.065	0.059						
Mt. Vernon	0.100	0.092	0.095	0.106	0.091	0.093	0.091	0.088	0.088	0.085	0.069	0.075						
Franconia	0.099	0.074	0.096	0.108	0.089	0.092	0.088	0.087	0.085	0.085	0.070	0.089	0.087	0.084	0.067	0.065	0.072	0.073
Annandale				0.108	0.083	0.091	0.085	0.085	0.084	0.082	0.070	0.054						
Seven Corners	0.093	0.079	0.045															
Lewinsville	0.087	0.082	0.09	0.099	0.075	0.084	0.08	0.088	0.083	0.080	0.068	0.056						
Ashburn	0.090	0.077	0.093	0.102	0.083	0.08	0.077	0.084	0.086	0.079	0.068	0.078	0.075	0.073	0.066	0.063	0.071	0.068
Long Park	0.089	0.079	0.089	0.087	0.086	0.077	0.074	0.086	0.076	0.074	0.064	0.073	0.071	0.072	0.066	0.062	0.067	0.067
Alexandria	0.096	0.077	0.091	0.103	0.083	0.08	0.081	0.084	0.084	0.075	0.066	0.081	0.084	0.086	0.062			
Max	*0.106*	*0.094*	*0.101*	*0.112*	*0.097*	*0.093*	*0.092*	*0.095*	*0.089*	*0.085*	*0.071*	*0.089*	*0.087*	*0.090*	*0.072*	*0.071*	*0.073*	*0.073*
Min	*0.087*	*0.074*	*0.045*	*0.087*	*0.075*	*0.070*	*0.074*	*0.081*	*0.076*	*0.074*	*0.064*	*0.054*	*0.071*	*0.072*	*0.062*	*0.062*	*0.067*	*0.065*
Median	*0.096*	*0.082*	*0.093*	*0.101*	*0.083*	*0.081*	*0.083*	*0.086*	*0.085*	*0.079*	*0.068*	*0.082*	*0.084*	*0.082*	*0.067*	*0.067*	0.071	*0.070*

* Blank data indicates that the monitor has not been installed or has been removed
* "-" data means that the monitor was temporarily out of service for that year

Table A-2: Second Highest 8-hour Average Carbon Monoxide Concentrations by Monitor (ppm)

Monitor	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
C&P Telephone	3.5	3.3	4.7	3.2	3.2	2.4	1.9	2.3	1.9	1.8	1.9	2	1.9	1.9	2.5	1.5	1.7	1.8
River Terrace	5.6	5	4.5	4.5	4	3.4	3.2	3.3	2.7	3.1	3.8	3.1	2.3	2.5	1.9	2	-	2.3
McMillian													2.4	1.8	1	1.2	1.5	1.3
Near Road																	2	1.7
Bladensburg	4.3																	
HU-Beltsville									0.9	0.8	0.9	1	0.8	0.9	1	0.8	0.9	.8
Arlington	3.8	2.7	2.7	2.6	2.5	2.2	1.6	2.3	1.5	1.1	1.3	1.7	1.4	1.4	1	1.1	1.7	1.6
Cub Run	1.2	1.5	1.3	1.2	1.4	1.2	1.5	1.2	1.3	1	0.9							
Seven Corners	2.1	2.3																
Annandale				1.5	1.6	1.4	1.3	1.2	1.1	0.9	0.8							
Lewinsville	3.1	3.5	3	2.3	2.7	2.3	1.9	2	1.6	1.5	1.3							
Springfield																		1
Alexandria (515100009)	3.6	2.9	2.4	2.4	2.8	2	1.6	1.8	1.4	1.2	1.4	1.6	1.4	0.8				
Alexandria (515100021)														1.6	3.1	1.3	1.7	-
Franconia	1.8	1.9	1.9	1.5	1.5	1.2	1.3	1.8	1.2	1.8	1							
Highest	*5.6*	*5*	*4.7*	*4.5*	*4*	*3.4*	*3.2*	*3.3*	*2.7*	*3.1*	*3.8*	*3.1*	*2.4*	*2.5*	*3.1*	*2*	*2*	*2.3*
Lowest	*1.2*	*1.5*	*1.3*	*1.2*	*1.4*	*1.2*	*1.3*	*1.2*	*0.9*	*0.8*	*0.8*	*1*	*0.8*	*0.8*	*1*	*0.8*	*0.9*	*.8*
Median	*3.5*	*2.8*	*2.7*	*2.35*	*2.6*	*2.1*	*1.6*	*1.9*	*1.4*	*1.2*	*1.3*	*1.7*	*1.7*	*1.6*	*1.5*	*1.3*	*1.7*	*1.6*

* Blank data indicates that the monitor has not been installed or has been removed
* "-" data means that the monitor was temporarily out of service for that year

Table A-3: Second Highest 1-hour Average Carbon Monoxide Concentrations by Monitor (ppm)

Monitor	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
C&P Telephone	5.4	5.9	5.2	7.5	8.3	3.4	2.9	3.2	2.7	4	2.5	2.7	4.2	2.2	4.4	2	2	2.1
River Terrace	7.3	6.6	6.3	5.6	7.6	4	3.8	4	3.8	3.7	4.2	3.7	2.7	2.9	2.2	2.5	-	2.7
McMillian													3	2.4	1.4	1.6	1.6	1.6
Near Road																	2.2	2
Bladensburg	7.5																	
HU-Beltsville									1	0.9	1.1	1.3	1.3	1.2	0.9	1	1	1.9
Arlington	4.9	3.5	4.1	3.4	4.1	3.2	2.3	1.8	1.8	1.6	1.7	2.2	1.9	1.6	1.2	1.6	1.9	3.7
Cub Run	1.7	2.4	1.7	1.4	1.9	1.6	1.7	1.2	1.4	1.4	1.1							
Seven Corners	3.2	4.2	2.8															
Annandale				2.1	2.2	1.8	1.6	2.2	1.4	1.1	1.1							
Lewinsville	7	5.6	4.6	3.3	3.3	3.6	2.5	2.1	2.1	2	1.7							
Springfield																		1.1
Alexandria (515100009)	4.7	4	4.3	4	3.5	2.9	2.3	2.4	2.1	1.9	1.7	2	1.7	1.4				
Alexandria (515100021)														1.7	4.9	1.7	5.1	-
Franconia	3.4	2.8	2.6	2.7	2.4	1.6	1.9	2.2	1.5	1.9	1.3							
Highest	*7.5*	*6.6*	*6.3*	*7.5*	*8.3*	*4*	*3.8*	*4*	*3.8*	*4*	*4.2*	*3.7*	*4.2*	*2.9*	*4.9*	*2.5*	*5.1*	*3.7*
Lowest	*1.7*	*2.4*	*1.7*	*1.4*	*1.9*	*1.6*	*1.6*	*1.2*	*1*	*0.9*	*1.1*	*1.3*	*1.3*	*1.2*	*0.9*	*1.0*	*1*	*1.1*
Median	*4.9*	*4.1*	*4.2*	*3.35*	*3.4*	*3.05*	*2.3*	*2.2*	*1.8*	*1.9*	*1.7*	*2.2*	*2.3*	*1.7*	*1.8*	*1.7*	*1.9*	*2.1*

* Blank data indicates that the monitor has not been installed or has been removed
* "-" data means that the monitor was temporarily out of service for that year

Table A-4: 99th Percentile 1-Hour Sulfur Dioxide Concentrations by Monitor (ppm)

Monitor	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
River Terrace	66	68	58	53	57	44	41	50	33	33	39	21	20	10	9	11	-	5
McMillan Reservoir													5	10	10	13	13	8
HU-Beltsville								35	34	28	24	10	12	12	7	14	9	5
Beltsville														13	12	16	10	9
Cub Run	34	34	26	25	29	32	28	25	24	22	28							
Seven Corners	51	55	57															
Annandale				42	41	45	42	36	33	28	35							
Lewinsville	49	49	61	40	43	43	42	35	35	37	31							
Alexandria (515100009)	150	86	86	92	103	71	78	46	42	31	36	7	14	17				
Alexandria (515100021)														8	9			
Lee District Park																11	9	5
Highest	*150*	*86*	*86*	*92*	*103*	*71*	*78*	*50*	*42*	*37*	*39*	*21*	*20*	*17*	*12*	*16*	*13*	*9*
Lowest	*34*	*34*	*26*	*25*	*29*	*32*	*28*	*25*	*24*	*22*	*24*	*7*	*5*	*8*	*7*	*11*	*9*	*5*
Median	*51*	*55*	*58*	*42*	*43*	*44*	*42*	*35.5*	*33.5*	*29.5*	*33*	*10*	*13*	*11*	*9*	*13*	*9.5*	*5*

* Blank data indicates that the monitor has not been installed or has been removed
* “-“ data means that the monitor was temporarily out of service for that year

Table A-5: Annual Average Nitrogen Dioxide Concentrations by Monitor (ppm)

MONITOR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Takoma	0.022	0.02	0.023	0.023	0.025	0.021	0.019	0.017	0.017	0.014	0.015	0.015	-	-	0.013	0.011	0.011
River Terrace	0.024	0.023	0.024	0.024	0.023	0.021	0.021	0.016	0.015	0.018	0.018	0.018	0.016	0.017	0.012	0.016	
McMillan Reservoir	0.018	0.018	0.024	0.023	0.023	0.022	0.022	0.019	0.018	0.016	0.015	0.016	0.015	0.014	0.012	0.011	0.014
HU-Beltsville							0.011	0.011	0.011	0.010	-	-	-	0.009	0.008	0.008	0.008
Arlington	0.025	0.023	0.022	0.022	0.026	0.022	0.021	0.018	0.016	0.013	0.013	0.013	0.012	0.012	0.011	0.011	0.011
Cub Run	0.011	0.01	0.009	0.009	0.01	0.01	0.01	0.008	0.008	0.006	0.007						
Seven Corners	0.023	0.02	0.023	0.018	0.018												
Annandale				0.018	0.018	0.017	0.018	0.015	0.013	0.011							
Lewinsville	0.02	0.021	0.02	0.019	0.023	0.018	0.017	0.015	0.014	0.013							
Long Park	0.012	0.009	0.011	0.011	0.012	0.01	0.009	0.007	0.007	0.006	0.006	0.005	0.006	0.005	0.005	0.005	0.005
Alexandria	0.025	0.023	0.023	0.025	0.023	0.024	0.024	0.02	0.018	0.016	0.015	0.016	0.013	0.012	0.013	0.012	0.012
Ashburn	0.014	0.013	0.014	0.014	0.016	0.015	0.014	0.013	0.011	0.008	0.007	0.008	0.008	0.007	0.007	0.007	0.008
Highest	*0.025*	*0.023*	*0.024*	*0.025*	*0.026*	*0.024*	*0.024*	*0.02*	*0.018*	*0.018*	*0.018*	*0.018*	*0.016*	*0.017*	0.013	0.016	0.013
Lowest	*0.011*	*0.009*	*0.009*	*0.009*	*0.01*	*0.01*	*0.009*	*0.007*	*0.007*	*0.006*	*0.006*	*0.08*	*0.006*	*0.005*	0.005	0.005	0.005
Median	*0.022*	*0.02*	*0.023*	*0.022*	*0.023*	*0.021*	*0.018*	*0.015*	*0.014*	*0.013*	*0.014*	*0.015*	*0.013*	*0.012*	0.012	0.011	0.011

* Blank data indicates that the monitor has not been installed or has been removed
* "-" data means that the monitor was temporarily out of service for that year

Table A-6: Maximum 24-Hour PM_{10} Concentrations by Monitor ($\mu g/m^3$)

MONITOR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
West End Library	50	-	53														
Connecticut Avenue	40	-	53														
McMillan											60	99	45	40	33	55	44
River Terrace				87	56	59	81	83	44	61	61	91	52				
HU-Beltsville												30	27	32	26	24	35
Suitland	64	59	54														
Cub Run	56	52	49	57	52	47	47	40	54	42							
Mt. Vernon	47	52	45	46	63	49	39	41	35	45							
Brandon Avenue	42	52	42	59	60	52											
Manassas	47	54	39	51	56	53											
Alexandria											50	42	43	29	28		
Ferdinand Drive											40	48	44	35	34	24	29
Highest	*64*	*59*	*54*	*87*	*63*	*59*	*81*	*83*	*54*	*61*	*61*	*99*	*45*	*40*	*34*	*55*	*44*
Lowest	*40*	*52*	*39*	*46*	*52*	*47*	*39*	*40*	*35*	*42*	*40*	*42*	*43*	*29*	*26*	*24*	*29*
Median	*47*	*52*	*49*	*57*	*56*	*52*	*47*	*41*	*44*	*45*	*55*	*69.5*	*44*	*33.5*	*30.5*	*24*	*35*

* Blank data indicates that the monitor has not been installed or has been remove
* "-" data means that the monitor was temporarily out of service for that year

Table A-7: Annual Average $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Monitor	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
River Terrace	15.9	18.9	16.9	16.3	14.9	14.9	14.9	13.4	13.6	12	10.5	11	10.4	9.3	9.3	10.2	
Park Services	15.3	15.3	15	15.6	13.4	15.5	15.6	13.3	13.7	12.2	10.2	11	10.2	9.8	8.3	9.1	9.2
McMillian Resivoir	18.1	15.7	16.1	15.6	14.3	14.4	14.6	13	13	11.7	10.2	10.5	10.3	8.4	9.1	9.4	8.9
Rockville	13.5	14.3	12.8	13	11.9	12.6	13.5	11.3	11.8	12.4	9.4	9.1	10.9	10.3	8.1	9.0	9.7
Bladensburg	19.3	18.3	17.1	18.4					14.1	13.4	10.7	11.5	10.1				
Greenbelt				12.1	11.5	9.8											
Beltsville						12.6	13.4	11.5	11.8	12	8.7	9.4	8.7	8.5	7.8	7.8	8.1
Suitland	15.2	14.4	13.5														
PG Equestrian Center				15.4	12.6	13.3	13.8	12.2	12.1	12.1	8.9	10.1	8.9	7.9	7.5	7.8	7.9
Arlington	13.8	14.9	14.7	14.9	14.1	14.5	15.3	12.9	13.9	12.3	10.1	10.3	10.1	9.4	7.9	8.7	9.2
Franconia	13.4	14.1	14.3	13.1	13.2	13.9	13.7	12.7	12.5	11.1	9.8	9.9	9.2	7.5	8.3	8.2	8.0
Seven Corners	14.5	15.3	13.9														
Annandale				13.7	13.2	13.7	14.4	12.7	13.3	11.2	9.5	9.7					
Lewinsville	14.3	15.1	14.5	14.1	13.6	14	14.8	12.7	13.5	11.9	9.7	10.5					
Ashburn	12.8	13.8	14.1	13.5	13.1	14.1	14.6	12.2	12.8	11.2	9.2	10.3	9.1	9	8.5	8.5	9.0
Highest	*19.3*	*18.9*	*17.1*	*18.4*	*14.9*	*15.5*	*15.6*	*13.4*	*14.1*	*13.4*	*10.7*	*11.5*	*10.4*	*10.3*	*9.3*	*10.2*	*9.2*
Lowest	*12.8*	*13.8*	*12.8*	*12.1*	*11.5*	*9.8*	*13.4*	*11.3*	*11.8*	*11.1*	*8.7*	*9.1*	*8.7*	*7.5*	*7.5*	*7.8*	*7.9*
Median	*14.5*	*15.1*	*14.5*	*14.5*	*13.2*	*14*	*14.6*	*12.7*	*13.2*	*12*	*9.8*	*10.3*	*10.1*	*9.0*	*8.3*	*8.7*	*9.0*

* Blank data indicates that the monitor has not been installed or has been removed

Table A-8: 98th Percentile 24-Hour $PM_{2.5}$ Concentrations by Monitor ($\mu g/m^3$)

Monitor	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
River Terrace	37.4	41.2	44.8	47.8	39	38.4	36.2	35	32.8	31.1	24.3	28	25	28	23	25	28
Park Services	34.7	37.2	35.1	35.9	38.7	36	36.4	33	28.7	31.6	22.7	23	26	28	19	21	22
McMillan Reservoir	35.4	38.6	43.7	40	35.2	34.8	34.4	33.2	33.1	30.8	24	26	25	24	22	22	22
Rockville	30.1	36.2	37.5	36.3	32.1	31.7	31.7	29.3	29.2	34.3	21.5	19	25	23	21	20	22
Bladensburg	36.7	42.9	38.9	35.2					31.5	33.4	21.2	25	23				
Greenbelt				27	32.3	16.9											
Beltsville						38.1	32.4	33.8	29	30.6	17.7	20	22	22	19	17	20
Suitland	36.5	36.5	35.2														
PG Equestrian Center				47.2	31.5	37.7	30.9	32.5	28.8	32.7	18.6	21	21	24	17	15	18
Arlington	34.1	37.7	37.2	35.6	39.2	35.7	34.2	32.5	29.5	31.4	23.2	22	21	22	21	19	21
Franconia	33.4	35.3	34.3	36.1	32.6	35.3	35.8	33.9	31.9	28.4	24.2	24	24	21	21	18	20
Seven Corners	35.7	38.7	37.2														
Annandale				35	36.7	34	35.1	32	29.5	22.7	20.8	19					
Lewinsville	38.3	37.2	37.8	33.7	32.9	33.7	34.6	32.4	30.9	25.6	21.2	20					
Ashburn	35.6	36.6	35.6	32.3	35.3	34.2	37.7	32.8	27.7	23.9	20	20	21	21	20	19	22
Alexandria												24	22	12			
Highest	*38.3*	*42.9*	*44.8*	*47.8*	*39.2*	*38.4*	*37.7*	*35*	*33.1*	*34.3*	*24.3*	*28.0*	*26.0*	*28.0*	*23.0*	*25.0*	*28*
Lowest	*30.1*	*35.3*	*34.3*	*27*	*31.5*	*16.9*	*30.9*	*29.3*	*27.7*	*22.7*	*17.7*	*19.0*	*21.0*	*12.0*	*17.0*	*15.0*	*18*
Median	*35.6*	*37.2*	*37.2*	*35.8*	*35.2*	*35.1*	*34.6*	*32.8*	*29.5*	*31*	*21.4*	*22.0*	*23.0*	*22.5*	*21.0*	*19.0*	*22.0*

* Blank data indicates that the monitor has not been installed or has been removed

APPENDIX B

Table B-110: AQI Index

Category	AQI	8-hr O_3 (ppb)	24-hr $PM_{2.5}$ ($\mu g/m^3$)	24-hr PM_{10} ($\mu g/m^3$)	8-hr CO (ppm)	1-hr SO_2 (ppb)	1-hr NO_2 (ppb)	Description
Good	0-50	0-54	0.0-12.0	0-54	0.0-4.4	0-35	0-53	**Air quality is considered satisfactory, and air pollution poses little or no risk.**
Moderate	51-100	55-70	12.1-35.4	55-154	4.5-9.4	36-75	54-100	**Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.**
Unhealthy for Sensitive Groups	101-150	71-85	35.5-55.4	155-254	9.5-12.4	76-185	101-360	**Members of sensitive groups may experience health effects. The general public is not likely to be affected.**
Unhealthy	151-200	86-105	55.5-150.4	255-354	12.5-15.4	186-304	361-649	**Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.**
Very Unhealthy	201-300	106-200	150.5-250.4	355-424	15.5-30.4	305-604	650-1249	**Health alert: everyone may experience more serious health effects.**
Hazardous	301-400	200-300	250.5-350.4	425-504	30.5-40.4	605-804	1250-1649	**Health warnings of emergency conditions. The entire population is more likely to be affected.**
	401-500	-	350.5-500.4	505-604	40.5-50.4	805-1004	1650-2049	

[1] 8-hr Ozone values do not define higher AQI values (>301)
** Index comes from EPA document on the Final Rule for Ozone NAAQS

Table B-211: How to Find Additional Information

	Organization	Address	Telephone/Internet
States	District of Columbia Department of Energy & Environment	1200 First St NE, Washington, D.C. 20002	(202) 535-2600 https://doee.dc.gov
	Maryland Department of the Environment	Air & Radiation Management 1800 Washington Blvd. Baltimore, MD 21230	(410) 537-3000 http://mde.maryland.gov
	Virginia Department of Environmental Quality	629 East Main St. Richmond, VA 23219	(804) 698-4000 http://www.deq.virginia.gov
Forecasts & Data	**Organization**	**Address**	**Telephone/Internet**
	EPA Air Quality Data Maps & Forecasts	Environmental Protection Agency 109 TW Alexander Drive (E 143-03) Research Park Triangle, NC 27711	www.airnow.gov
	Metropolitan Washington Council of Governments	777 N. Capitol Street, NE Suite 300 Washington, D.C. 20002	(202) 962-3200 www.mwcog.org
Other Organizations	**Organization**	**Address**	**Telephone/Internet**
	Clean Air Partners	777 N. Capitol Street, NE Suite 300 Washington, D.C. 20002	(877) 515-4593 www.cleanairpartners.net
	EPA Homepage	Environmental Protection Agency 1200 Pennsylvania Avenue, N.W. Washington, D.C. 20460	www.epa.gov
	EPA Region 3	1650 Arch Street (3AP00) Philadelphia, PA 19103-2029	(215) 814-5000 https://www.epa.gov/aboutepa/epa-region-3-mid-atlantic
	EPA Office of Transportation and Air Quality	Environmental Protection Agency 1200 Pennsylvania Avenue, N.W. Washington, D.C. 20460	www.epa.gov/otaq
	Mid-Atlantic Regional Air Management Association	8600 LaSalle Road Suite 636 Towson, MD 21286	(443) 901-1882 www.marama.org
	EPA Office of Air Quality Planning and Standards	109 T.W. Alexander Drive Durham, NC 27709	https://www.epa.gov/aboutepa/about-office-air-and-radiation-oar#oaqps
	Ozone Transport Commission	Hall of the States 444 N. Capitol Street Suite 322 Washington, D.C. 20001	(202) 508-3840 www.otcair.org